

What is claimed is:

1 1. A method for removing fluorine gas from a selected environment,
2 comprising the steps of: (a) contacting the fluorine gas from the
3 environment with a selected quantity of water, thereby to generate an
4 acidic solution of hydrofluoric acid; and (b) contacting said acidic solution of
5 hydrofluoric acid with an ion-exchange resin having an active state
6 operative to exchange selected ions therein for fluoride ions in said acidic
7 solution when in contact therewith,

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9 wherein said ion-exchange resin is capable of chemically shifting
10 between said active state and an exhausted state operative to exchange
11 the fluoride ions in said ion-exchange resin for the selected ions contained
12 in a regenerant solution when in contact therewith, and including the step of
13 regenerating said ion-exchange resin by contacting said ion-exchange
14 resin with the regenerant solution thereby to form a selected regenerant
15 waste product containing the fluoride ions, and

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17 wherein said regenerant solution is selected from the group
18 consisting of ammonium hydroxide solution, waste ammonium hydroxide
19 solution, and any combination thereof.

1 2. A method according to claim 1 wherein the regenerant solution is
2 waste ammonium hydroxide solution.

1 3. A method according to claim 1 wherein the waste ammonium
2 hydroxide solution is generated from one or more processes associated
3 with the fluorine gas from a selected environment.

1 4. An apparatus for use in removing fluorine from a selected
2 environment, comprising: (a) an inlet in communication with the selected
3 environment and operative to provide fluorine gas therefrom; (b) a conduit

4 in communication with said inlet and adapted to receive fluorine gas
5 therefrom, said conduit operative to transport an aqueous solution
6 therethrough; (c) a resin vessel in fluid communication with said conduit
7 and operative to receive the aqueous solution therefrom; and (d) an ion-
8 exchange resin disposed in said resin vessel and adapted to contact said
9 aqueous solution, said ion-exchange resin having an active state operative
10 to exchange selected ions therein for fluoride ions in said aqueous solution
11 at an acidic pH when in contact therewith,

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13 wherein said ion-exchange resin is capable of chemically shifting
14 between said active state and an exhausted state operative to exchange
15 the fluoride ions in said ion-exchange resin for the selected ions contained
16 in a regenerant solution when in contact therewith, said apparatus including
17 a regenerant source vessel adapted to receive the regenerant solution,
18 said regenerant source vessel in fluid communication with said resin vessel
19 and operative to selectively provide the regenerant solution to said resin
20 vessel, and

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22 wherein said regenerant source vessel is operative to selectively
23 provide a regenerant solution selected from the group consisting of
24 ammonium hydroxide, waste ammonium hydroxide, and any combinations
25 thereof.

1 5. An apparatus according to claim 4 wherein the regenerant solution is
2 waste ammonium hydroxide solution.

1 6. An apparatus according to claim 4, wherein the waste ammonium
2 hydroxide is generated from one or more processes associated with the
3 fluorine from a selected environment.